Amendment to the Specification

Please replace the entire contents of the text of the Summary of the Invention beginning on page 5 with the following text:

The present invention is directed to apparatus and methods of operation that are further described in the following Brief Description of the Drawings, the Detailed Description of the Invention, and the claims. Other features and advantages of the present invention will become apparent from the following detailed description of the invention made with reference to the accompanying drawings.

Please rewrite the last two paragraphs that begin on page 14 (and extend to page 15) as follows:

Figure 3 shows an example top level diagram of an RF transmitter in accordance with the present invention. The top-level diagram of an RF transmitter 88 of Figure 3 is employed within the Bluetooth Medium Rate Standard in the described embodiment of the invention. The Medium Rate Bluetooth transmitter 88 employs both binary frequency-shift-keying (FSK) as well as 4 and 8 level phase-shift keyed (PSK) modulation. The baseband processor provides outgoing transmit data (TX data), i.e., either binary data for FSK modulation or 2- or 3-bit data for PSK modulation, as well as basic transmit (TX) timing control. The symbol rate remains constant while the data rate varies according to modulation type (data rate provided by the baseband processor varies).

While the modulation switching scheme proposed here is generally applicable to any transmitter that provides continuous switching between phase-shift keyed (PSK) and frequency ~~shift keying(FSK)~~ shift keying (FSK) modes, many of the details are for an exemplary transmitter intended to support the Bluetooth Medium Rate Standard which employs both binary FSK as well as 4 and 8 level PSK modulation with a symbol rate of 1MHz. As shown in Figure 3, RF transmitter 88 includes a baseband processor 90 that produces TX data and TX control to a digital modulator 92 followed by I/Q channel digital to analog converters (DACs) 94 and 96, low pass filters (LPFs) 98 and 100 that filter the continuous waveform outputs produced by DACs 94

and 96, mixers 102 and 104 that are coupled to received filtered continuous waveform signals from LPFs 98 and 100 for mixing with I and Q channel local oscillations produced by local oscillation generator 106 wherein mixers 102 and 104 produce upconverted I and Q channel RF signals. Finally, the I and Q channel RF signals are summed and produced to a power amplifier (PA) 110 for amplifying and radiating from an antenna.

Please rewrite the last paragraph of page 19 as follows:

Pulse Shaping block 112 produces one of two meaningful outputs. In an FSK mode of operation, as specified by the modulation control signal from modulation switching control block 118, pulse-shaping block 112 produces FSK phase information to a phase accumulator 114. In a PSK mode of operation, pulse-shaping block 112 produces PSK modulated data to a multiplexer mux 116. In a first mode of operation, namely FSK mode, the output on the I and Q channels for the PSK modulated data is a "don't care" signal. As may be seen, mux 116 is further coupled to receive a logic 1 and a logic 0. Thus, in the first mode of operation, namely the FSK mode, mux 116 receives a portion of a mode control signal, more specifically, a mux control signal, to select the logic 1 and logic 0 for outputting to a CORDIC. Accordingly, the I and Q channel outputs of pulse-shaping block 112 are decoupled from any circuitry by mux 116. Further, in the FSK mode of operation, pulse-shaping block 112 produces logical bits that represent phase information to the phase accumulator 114. Phase accumulator 114, as will be described in greater detail below, includes a delay element and a feedback loop to accumulate phase information as it is received.

Please insert at page 30, line 12 the following text which is based upon the deleted text from the Summary of the Invention Section of the Specification:

The present embodiments of the invention provide a radio transmitter having a digital modulator that further includes logic for continuous amplitude and continuous phase modulation switching in an RF transmitter intended to support both frequency shift keying (FSK) and phase-shift keying (PSK) modulation techniques in a smooth and continuous manner that does not violate spectral mask requirements. Additionally, the symbol timing is preserved. The invention

supports continuous modulation switching both ways, i.e., from FSK to PSK and from PSK to FSK.

A radio transmitter formed according to one embodiment of the present invention includes a Pulse Shaping block that is coupled to receive outgoing data (TX data) from a TX data source, such as a baseband processor. The Pulse Shaping block produces frequency shift keyed (FSK) modulated TX data and phase-shift keyed (PSK) I and Q channel modulated data concurrently. Multiplexer (mux) circuitry is coupled to receive the I and Q channel modulated data, as well as a logic 1 and a logic 0. In the described embodiment, the mux circuitry, which comprises a 4X2 mux, outputs one of the I and Q channel modulated data or the logic 1 and logic 0 according to a received control command. The Pulse Shaping block, in operation, modulates a stream of 0 bits and produces a stream of FSK modulated 0 values and PSK modulated I and Q data for a first logic state of a mode control signal, and further produces FSK modulated TX data for a second logic state of the mode control signal. Accordingly, the mux control circuitry, by sending control signals to the mux, couples either the PSK modulated I and Q data to downstream modulation circuitry for the first logic state of the mode control signal and couples the logic 1 and logic 0 to the downstream modulation circuitry for the second logic state of the mode control signal. The downstream modulation circuitry further includes a coordinate rotation digital computer (CORDIC) that receives the FSK modulated signals (either 0 values or phase information), as well as the I and Q channels (either the I and Q channel modulated data or the logic 1 and logic 0).

Coupled between the Pulse Shaping block and the CORDIC, is a phase accumulator that receives and accumulates phase information from the Pulse Shaping block. Accordingly, even when the Pulse Shaping block produces a stream of FSK modulated 0 values, the phase accumulator will produce a phase since its output is continuously fed into its input in a feedback loop. By adding a constant at the accumulator input, a phase ramp, or, equivalently, a non-zero IF frequency, can be imposed upon the transmitted signal.

In operation, the radio transmitter initially operates in a first communication mode, transmitting communication signals to a remote agent according to a first protocol utilizing a first modulation technique at a first data rate. For example, the first protocol may comprise an FSK modulation for legacy Bluetooth protocol communications at a 1Mbps data rate. Upon

determining that the remote agent is capable of communicating in a second protocol (e.g., medium rate Bluetooth) at a second data rate of 2 or 3Mbps utilizing a second modulation technique, the radio transmitter will operate in a transition mode for a short period transmitting communication signals with a remote agent according to the first and second modulation techniques. Finally, in a second communication mode, the transmitter transmits communication signals with a remote agent solely according to the second protocol utilizing the second modulation technique at the second data rate. Throughout the first and second communication modes, as well as the transition mode, the transmitter, according to the described embodiments of the invention, will transmit in accordance with spectral mask requirements.